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OF THE

MASSACHUSETTS ASSOCIATION

OF

BOARDS OF HEALTH

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Information for the Public

APRIL, 1901

Proceedings of the January Annual Meeting

Subjects: Glanders — Diphtheria Bacilli in Well Persons — Sanitary Improvement of Marsh Lands (Illustrated)

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JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

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January Meeting, 1901

SUBJECTS: Glanders — Diphtheria Bacilli in Well Persons — Drainage, Reclamation, and Sanitary Improvements of Marsh Lands near Boston (Illustrated).

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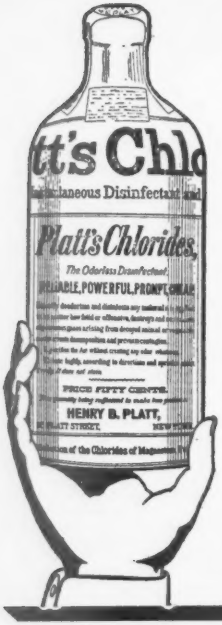

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THE JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH was organized in Boston in March, 1890, with the following objects: the advancement of sanitary science in the Commonwealth of Massachusetts; the promotion of better organization and co-operation in the local Boards of Health; the uniform enforcement of sanitary laws and regulations; and the establishment of pleasant social relations among the members of the Association.

All persons holding appointments as members of a Board of Health in a Massachusetts city or town, the executive officers of such a local board, and the members of the State Board of Health are eligible to membership. Other persons may be elected members by vote of the Association. The annual dues are one dollar and fifty cents, and should be paid to the Treasurer, James B. Field, M.D., 329 Westford Street, Lowell, Mass.

The Association holds four regular meetings each year, the annual or January meeting always being held in Boston.

THE OFFICIAL JOURNAL OF THE ASSOCIATION is a quarterly publication, containing the papers read at the meetings, together with verbatim reports of the discussions following them.

All communications to the Association should be addressed to the Secretary, **EDWIN FARNHAM, M.D., City Hall, Cambridge, Mass.**

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JOURNAL OF THE

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

ORGANIZED 1890.

[The Association as a body is not responsible for statements or opinions of any of its members.]

VOL. XI. April, 1901. NO. 1.

JANUARY MEETING

OF THE

Massachusetts Association of Boards of Health.

The January quarterly (or regular annual) meeting of the Massachusetts Associations of Boards of Health was held in Boston at the Parker House on the afternoon of Thursday, January 24, Dr. Samuel H. Durgin, Vice-President, in the chair.

THE CHAIRMAN.— The time has arrived, gentlemen, when we should commence our business of the afternoon. The first thing on the programme is the election of officers for the ensuing year. A motion for a nominating committee would be in order.

DR. PRESCOTT.— I move a nominating committee of three be appointed by the chair.

DR. MILLER.— I second the motion.

The motion was adopted.

THE CHAIRMAN.— I will appoint Dr. Pilsbury, Dr. Chase, and Dr. Everett. If they will assemble in another part of the room and attend to this duty as soon as possible, we will get at the remainder of the business readily. During this time I will request members of the Ex-

ecutive Committee to assemble at this end of the room for a short session. All those who have names to hand in for membership in the society will please hand them in now at this end of the room. You will now listen to the report of the last meeting by the Secretary.

The minutes of the meeting held at Fitchburg on Oct. 18, 1900, were read and approved.

THE CHAIRMAN.— The Secretary will please read the vote of the Executive Committee.

MR. COFFEY.— The Executive Committee by vote recommend the following persons for membership: —

WILLIAM RODMAN PEABODY		Cambridge.
G. LINCOLN ALLEN		Salem.
MORGAN MCSWEENEY		Salem.
DR. A. R. PERRY		Somerville.
DR. A. L. BROWN		Springfield.
J. C. RAUSEHOUSEN		Springfield.
W. H. HITCHINGS	Somerville,	Veterinary Surgeons.
LANGDON FROTHINGHAM	Boston,	

THE CHAIRMAN.— What is the pleasure of the Association in this matter?

On motion of Dr. Prescott the Secretary was instructed to cast one ballot for these gentlemen. The Secretary cast the ballot, and they were admitted to membership in the Association.

THE CHAIRMAN.— Is the Nominating Committee ready to report? If not, we will listen to the annual report of the Treasurer, Dr. Field.

Dr. Field then read his annual report as Treasurer, as follows: —

TREASURER'S REPORT FOR 1900.

RECEIPTS.

Balance on hand	$919.50	
Received from interest	28.12	
Received from annual assessments	300.50	
Total receipts		$1,248.12

EXPENDITURES.

Prize essay	$50.00	
Printing	44.30	
Postage and revenue stamps	33.62	
Cigars, dinners for guests, etc.	31.50	
Clerical assistance	22.00	
Total expenditures		$181.42
Balance to 1901		1,066.70
		$1,248.12

Of this balance $967.28 is in a saving's bank, drawing interest.

Respectfully submitted,

JAMES B. FIELD, *Treasurer.*

Examined and approved as correctly cast and properly vouched for.

J. ARTHUR GAGE, *Auditor.*

On motion of Dr. Prescott the report was accepted and placed on file.

THE CHAIRMAN.— It might seem that the length of time allotted for a discussion upon the subject uncompleted at the last meeting was rather small, but it became necessary in order to get through with the programme this afternoon. We will have a discussion for twenty minutes upon this subject, and this will necessitate giving each speaker but five minutes. The first will be that of Dr. Palmer, who has a new case to report.

DR. PALMER.— Mr. President and gentlemen, I don't know whether I shall be able to report my case intelligibly in the five minutes that the President has allotted me; but he can call me down at any time he chooses.

Your President has honored me by asking me to report a case of glanders that came into the Framingham Hospital during the month of November. On the 12th of November, late in the evening, I was first called to see the case. Before I give any description of the case as I found it, I will read a letter from the physician who had it in charge before the patient came into the Framingham Hospital, and who, by the way, was the chairman of the Board of Health in the town that he came from, and he gives me the following history of the case: —

MILFORD, MASS., Jan. 15, 1901.

Dear Doctor,— Sunday, Oct. 21, 1900, in the afternoon I was called to Adams's livery stable to attend one of the hostlers, who was confined to his room in a barn. I found Edward Mahoney, aged about twenty-seven. Patient said he had been feeling poorly for a day or so. The attack was ushered in by chills, or rather chilliness, flashes of heat, lassitude, headache, pains in back and limbs, feeling of some constriction about the chest. Patient complained most of feeling of soreness about body and limbs and as though he "had been pounded," also complained of headache and fever. Pulse about 100. Temperature, 102 degrees.

Diagnosis: grip.

October 29. Saw patient downstairs in barn in morning (was in the office) and said he was feeling much better. Did not examine him again, as fever had apparently left him and he was free from pain, but was feeling some lassitude.

Patient left stable in morning after I saw him, and *am informed* that for the remainder of the day (Monday, 29) and all the next day following, Tuesday, 30, he was intoxicated. This was not an unusual condition for the patient to be in, whether sick or well.

October 31. Patient came into my office early in the morning, looking very "rocky." Said he had been exposed to the cold and wet, and thought he "must have taken a fresh cold." He complained of a severe, sharp, and lancinating pain in the left side of chest. Patient looked pale and anxious. Pulse about 100, and temperature 101 3-4 degrees. Difficult respiration. There was dulness over the apex of the left lung. There was constant dry cough. My diagnosis is acute pleurisy.

From November 1 to November 6 there was no change in the symptoms, except that the dulness increased, and the pain increased also. Temperature, 102 degrees.

November 7. Dr. George T. Curley called in to-day in consultation, and diagnosed pleurisy. He was of the opinion that there was some fluid in the lung, and advised aspiration to be done the next day. This I did not do, but put patient on large doses of Syr. Ferri Iodidi.

November 8. Condition of patient unchanged, pulse and temperature remaining about the same all through the attack. Patient delirious at times.

November 9 to 11. Symptoms unchanged. Delirium almost constantly.

November 12. Delirium severe. Pulse weaker, but temperature approximately the same. Dr. Curley again in consultation, and thought it would be advisable to aspirate, which we did, but found no fluid.

To-day, for the first time, was noticed a pustular eruption about the hands and arms and one or two about the body. These pustules varied in size from a ten-cent piece to a quarter of a dollar. The throat was clear, and there was no glandular enlargement in any place about the body.

Patient later in day was removed to Framingham Hospital.

Yours respectfully,

CHARLES H. COLE, M.D.

That is the history of the patient up to the time he entered our hospital. I saw the patient late at night, and found him in a wildly delirious condition, a pulse of 120, temperature of 103 to 104 degrees, respiration of 50, in a typhoidal condition, constantly talking, muttering, picking at the clothing and into the air, and having a dry, brown furred tongue. I looked into the throat that night, and it was fortunate that I did; and the only thing to be seen was a large sore on the base of the tongue on the right side, which looked very similar to a chancre. I would say that this sore had not been recognized by the other doctors, neither was any other doctor who saw the case with me afterwards able to see it, because it was impossible to see into his mouth. There was no running from the nose, there was practically no glandular enlargement; but there was a very suspicious eruption, which was referred to by Dr. Cole. The eruption was so suspicious, pustular, and some of it umbilicated, that I did not like the looks of the patient; and I ordered him strictly quarantined, and left word for our senior physician in town, a man of great experience and one who had seen much of small-pox, to be called in consultation the next morning.

At my visit the next morning about 9 I found that this experienced physician, who had seen very many cases, had been present, and had diagnosed the case as unmistakably a case of small-pox, and immediately had rushed away to the village to get vaccine points to vaccinate all the possibly infected cases.

I want to diverge enough to say, gentlemen of the boards of health of the State, that you can imagine what my feelings were. I had lain awake at night dreaming of the time when I might have a case of small-pox to contend with, and wondering what in creation I should do with one if I had it; and my dreams had become a reality. I not only had, according to this physician, a case of small-pox, but I had it very warmly and comfortably located in a general hospital. I leave it to you individually, gentlemen, to imagine how I felt. Suffice it to say that I did not enjoy my mind.

This good doctor was quite exercised in his mind, because I questioned his diagnosis. I did not doubt his word, but I thought I would have further advice. So I sent to that epitome of all sanitary knowledge in Massachusetts, that has a good reputation everywhere,

not only in this State, but in other States,— the State Board of Health. One of their representatives came out and saw the case; and in a very judicious and politic way he said: "It is a very suspicious case. It may be small-pox. At any rate, I would advise you to isolate the case, and regard it as such."

I am not noted for my conservatism; but I have since congratulated myself that the best thing I did in that case was to be on the safe side, and throw out as many anchors to windward as I possibly could. Without delay I summoned home from Boston, Dr. Sharp of our local board, and we telephoned in for the wisdom that there was in the Boston City Board of Health; and one of their doctors came, Dr. T. B. Shea, bearing the first message of peace, and the olive branch. After looking the patient over carefully, he said, "I am sorry to disagree with my beloved friends of the State Board, but I think you may be assured that you have *not* a case of small-pox." That "not" was the happiest word that I ever heard in my life.

The history of that case during the day was this: The symptoms all rapidly increased. The patient's condition grew rapidly worse. The pustular eruption spread over the body, so that there probably were 100 pustules before the time of his death. The pustules were both discrete and confluent. They were umbilicated. They had the red flush around them. They did not appear in the mouth; they were not in the nose. Besides the pustular eruption, which was so similar to that of small-pox, was the inflammatory condition of the joints,— the finger joints, both wrist joints, both elbow joints, the right knee and the right ankle, and the toes of both feet looking very suspicious that pus might be present. He lived about thirty-six hours, and died on Wednesday morning early, his temperature rising to 108 degrees before he died.

We had a *post-mortem* examination made, through the kindness of Dr. Richardson of the Massachusetts General Hospital Pathological Department; and the gross pathology of the case was briefly this: The heart, the stomach, the bowels, the bladder, the testicles, and the liver were normal, also the blood-vessels. Both kidneys were very large. The spleen was about two and a half times its normal size and soft. There was a slight pleuritic condition of the left lower lobe, where the pain had been located, and where it was thought

that there was fluid, but no fluid was present. The left lung was in a condition of septic pneumonia. The meninges of the brain were ædematous. There were no lymphatic glands infected. The nose was clear. Pus from these pustules was taken by Dr. Shea before death and a guinea pig inoculated, which after about forty-eight hours showed the typical testicular enlargement. Cultures were made, and the case was proved to be unmistakably a case of glanders.

The interesting features of the case were the absence entirely of any discharge from the nose or throat, the pustular eruption, which was so similar to that of small-pox, the short time in which the inflammatory action went on before the patient's death, there being no pus in any of these inflammatory joints, as there undoubtedly would have been, had his strength been sufficiently maintained to keep him alive a few days longer.

The source of infection was from a glandular horse in a stable in the town of Milford, which had been sick, killed, and buried without its being known what the disease was. Through the persistence of Dr. Rogers, agent of the Cattle Commission, the horse was exhumed; and a *post-mortem* showed it to have been unmistakably a case of glanders.

No harm came from its being in our hospital. The hospital was thoroughly fumigated, the nurses were quarantined, clothing was destroyed; and we have had no farther trouble, thanks be to the good Lord.

THE CHAIRMAN.— The case was so full of interest that I have taken the liberty to let the gentleman pass beyond the time limit. Is there any gentleman from Fitchburg who would like to speak upon this question? If not, I will call upon Dr. Shea for a few remarks.

DR. SHEA.— Mr. Chairman and gentlemen, in regard to this particular case there is not much to be said. Dr. Palmer has covered the ground pretty thoroughly. We ought to learn something from these cases. I think in this case and all cases, you might say, of acute infectious diseases, where the occupation of the patient is dealing with horses, the question of glanders should always be considered. True glanders in the human being is very rare; yet cases occur occasionally, and we should be prepared to deal with them.

The eruption, as Dr. Palmer has described it, was very suspicious of small-pox, but the patient's occupation, and the history of the disease, suggested the existence of glanders.

Bacteriology is of great assistance in these cases, and from the work of the bacteriological laboratory the diagnosis of glanders was confirmed.

THE CHAIRMAN.— Is Dr. Burr present? If so, would he like to say a word upon this case?

DR. BURR.— I don't know that I can add much, Mr. President, except to emphasize the fact that it is not uncommon to find these cases of glanders in stables treated by men, hostlers, etc., in a very careless manner. One often goes into a stable and finds a man dressing a horse with sores upon the legs or other parts of the body or a discharge from the nose, and handling the parts without any care whatever. It is seldom that a man in that employ has not got some sort of a scratch or cut upon his hands. Certainly, glanders must be of very low virulence to man, or else we should have a great many more cases of human glanders. A case occurred about a week or two ago where a swab preparation from the nose of a suspected horse had been sent, by the attending veterinarian, to the laboratory for diagnosis. Guinea pigs were inoculated, and in the course of three days a positive diagnosis was made on the case. I had not seen the case in the mean time; but, when a positive result was obtained, I examined the case, and found it to be in a milk stable. The owner desired more time to treat the horse, and was very much surprised to think that immediate action should be taken; but, for fear of contaminating the milk supply, I decided that no time should be lost, and that the horse should be immediately killed. This same horse was driven and cared for by the hostlers who also handled the milk supply received at that milk stable. This case certainly illustrates the exceedingly careless manner in which cases of glanders in horses are treated by owners and attendants.

THE CHAIRMAN.— The next item on the programme is a report of the committee on "Diphtheria Bacilli in Well Persons," by Dr. C. V. Chapin, chairman.

DR. CHAPIN, Providence.— Mr. President, our committee regrets exceedingly to come before you again without being able to present a final report; but we have done a great amount of work, or, at least, the secretary of the committee has done a great amount of work, in sending out inquiries to those who are interested in this subject. All that we felt that we could do to-day was to present a brief summary of the replies received, in order that you might see how much trouble others are undergoing as well as ourselves, and to ask for an extension of time in order that we may await the results of investigations into this subject,— investigations into the relative presence of diphtheria bacilli in the well under different conditions. Such investigations are now being made by a number of bacteriologists, and the committee hopes later to receive returns from them; and from the information so obtained we hope to be able to deduce some reasonable plan of action which should be taken by boards of health in these cases. I will therefore ask Dr. Hill, the secretary of the committee, to state the position of the committee at the present time and what little we have learned.

Dr. Hill then presented the following report: —

REPORT OF COMMITTEE ON DIPHTHERIA BACILLI IN WELL PERSONS.

A meeting of this committee was held Nov. 15, 1900, at the rooms of the State Board of Health of Massachusetts, courteously offered for its use by Dr. S. W. Abbott.

Members present: Dr. Charles V. Chapin in the chair, Drs. Abbott, Denny, Gage, Shea, and Hill (secretary).

Members absent: Drs. Baker, Darling, Hudson, and Mr. Gove.

The chairman made an address, which was incorporated in the report read at the annual meeting, Jan. 24, 1901. (See below.) The answers to the circular of questions sent out by the committee to the various State and municipal boards of the United States and Canada were read and discussed. (See below).

The secretary was instructed to invite the co-operation of about twelve laboratories in different parts of the country, with the object

of determining by a large co-operative investigation the percentage of well persons not exposed to diphtheria who, nevertheless, have diphtheria bacilli present in the throat or nose, and the evidence of any diphtheria bacilli thus found.

It was voted to present a report of progress, and to ask for an extension of time for the committee at the next regular meeting of the Association.

ADDRESS OF THE CHAIRMAN OF THE COMMITTEE ON DIPHTHERIA BACILLI IN WELL PERSONS.

This committee believes that the problem intrusted to it cannot be settled off hand. There appear to be a number of preliminary questions which must be answered before we can decide what to do with well persons who are infected with diphtheria bacilli. We have assumed, however, that it is proved that the bacillus is the essential cause of the disease, and that it can be recognized with a reasonable degree of accuracy by the methods ordinarily employed in the laboratory.

Among the things which it seems important to know are: —

First. The prevalence of the bacillus among the well. If it is a fact that diphtheria bacilli are rarely found except in convalescents and those who are about the sick, it may be feasible to secure the isolation of such persons. But, if the organisms are pretty widely distributed, it will be a much more difficult matter. If it should turn out that there are three thousand or four thousand persons infected in Boston, would not the score or two that the Board of Health might discover object to isolation, and would not they receive the backing of the medical profession and the courts?

Second. Our problem might be simplified if we knew more about the degree of danger to be apprehended from the bacilli in the well. That they are sometimes dangerous is shown by some of the answers received from our correspondents. Moreover, it has long been known that well persons do transmit diphtheria to others. We have, on the other hand, found it to be probable that diphtheria bacilli in well persons sometimes lose their virulence. This suggests our next problem.

Third. How can we determine the virulence of the bacilli for human beings? The ordinary method of testing virulence is by the inoculation of guinea pigs, but some doubt has been thrown upon its reliability. Furthermore, it would hardly be feasible to test in this way any considerable proportion of cultures that daily come to our laboratories. Diphtheria bacilli are known to present great morphological differences, and it is possible that these differences may give some indications of the degree of virulence. But at present sufficient data have not been obtained to determine this point.

Fourth. What amount of evidence is required to determine the presence or absence of diphtheria bacilli in the well? Is a single culture from the throat sufficient? Experience has shown that there is a considerable margin of error in this. A negative culture may be followed by a positive culture. What the percentage of error is, is not known. It may perhaps be very considerable. As will be shown in the summary of the replies to our circular of questions, there is evidence to show that diphtheria bacilli are found in the nose more often than in the throat. In order to decide whether a person is infected with diptheria bacilli, shall we examine the throat or the nose, or both, and shall we trust to one swabbing or shall we require two or three? Should not both nostrils be examined?

Fifth. Is there any difference in the conditions under which diphtheria bacilli are found in well persons, on which can be based different methods of control? It may be that those who have been recently infected are the most dangerous. Perhaps infected well persons, who have not been in recent contract with the sick, rarely do harm, and need not be isolated; while those who are with the sick, and show the bacilli, should be. We do not know about this at present; but we should know before we formulate any plan of official discrimination.

Sixth. Convalescents from diphtheria usually retain bacilli until after they have entirely recovered. They then belong to the class of infected well persons. If they are isolated, why should not all infected well persons be isolated and *vice versa?*

It was to obtain data for the solution of the problems here suggested that the committee sent out circulars of inquiry. The following summary of these replies is here submitted: —

SUMMARY OF REPLIES TO QUESTIONS OF COMMITTEE ON "DIPHTHERIA BACILLI IN WELL PERSONS."

1. Have you established an organized system for the bacteriological examination of cases of suspected diphtheria?

Cities with laboratories	37
States with laboratories	4
Provinces with laboratories	2
Towns depending on State laboratories	7
Hospitals	2
	52
Cities without laboratories	10
States without laboratories	2
Total replies by circular	63
Replies by letter	11
Total replies	74

2. What number of cases examined for diagnosis show a negative culture on the first examination and a positive culture on a subsequent examination? (Give exact figures, if possible.)

None	1	
Very few	8	
½ to 2%	7	
3 to 5%	8	
6 to 10%	2	
12½% (hospital)	1	
25%	1	(2% if swabs exam.)

3. What do you require for the release from isolation of diphtheria patients?

1 neg. culture, nose or throat	18	
1 " " nose and throat	2	
1 " " or time limit after memb.	4	
1 " " and time limit	3	
2 cons. neg. culture, nose or throat	5	(2 hospital)
2 " " " nose and throat (Boston)	1	
2 " " " " " " (hospital)	1	
Absence of bacilli	2	

Baltimore and Providence require also one neg. culture from others in family.

No cultures required:

	Laboratory.	*No Laboratory.*
Physician's certificate alone	5	6
" " and time	5	6
" " or time	0	1

In three of these, cultures are advised also.

4. Do you examine bacteriologically, as a routine practice, the throats and noses, or both, of those who may be in contact with cases of diphtheria?

Yes, 6; sometimes, 8; in inst., 6; no, 20.

5. When cultures from diagnosis are taken separately from both nose and throat of sick persons, what proportion of the cases so treated give the following results? (Give actual figures.)

Rochester . . . . . 75% of cases show th. + n. +
Fitchburg . . . . . 2 of cases show th. + n. +
Providence and Newton, Hospital . . . . . 196 cases { th. + n. +, 32%; th. + n. —, 13%; th. — n. +, 26%; total, 71%

Providence: of 15 cases where both nostrils were examined, 7 were positive in both nostrils; 8 were positive in one nostril only.

6. When cultures are taken separately from both nose and throat of well persons exposed to diphtheria, what proportion of the cases so tested show both throat and nose positive, both negative, or one positive, the other negative?

	Th. + *N.* +	*Th.* + *N.* —	*Th.* — *N.* +	*Th.* — *N.* —	*Total.*
Providence . .	32	35	98	621	= 286, or 20% pos.
Syracuse . . .	0	61	5	59	= 125 (asylum)
Newton Hospital,	4	1	2	1	= 8
Willard State Hosp.,	0	1	18	902	= 921 (all in hosp. considered exposed).

Syracuse: 3 of the pos. developed clin. symptoms and died. The rest were immunized and remained well.

	Th. + *N.* +	*Th.* + *N.* —
Fitchburg . . .	20	5 pos.
Boston	20	4 (99)
Boston	35	1 (98)
Minneapolis . .	200	5 (1 had had diph., another developed it later).

Rochester. A small number.
Minnesota. *See* tables.

Throat only, 4; total, 275; 15 pos. or 5.5%; .8 developed disease th. and n. = 4; total, 1,840.

th. + n. +, 2%.
th. + n. —, 5.4%
th. — n. +, 7%

total, 14.4% 16% developed diphtheria.

7. When cultures are taken separately from both nose and throat of **well** persons **not** exposed to diphtheria so far as known, what proportion of the cases thus tested show the following results?

	Th. + *N.*+	*Th.* + *N.* —	*Th.* — *N.*+	*Th.* — *N.*—	*Total.*
Providence:					
Hospital	6	2	12	10	30
Pulm. clin. . . .	0	1	3	6	10
School free of diphtheria 3½ years .	10	13	16	121	160
Children admitted to asylum . . .	2	0	0	2	4
	18	16	31	139	204 or 30% pos.

Syracuse . . . . 300 examined: all neg.
Newton Hospital . . 5 " " "

Note.—Providence: exposed persons, 20% +; not exposed, 30%.

	Throat Only.	
Providence: School	223	7 pos.
Diphtheria officials	20	0 "
Throat and nose clin.	162	3 "
Providence Hos. patients	3	0 "
Orphanage (no diphtheria 18 months)	50	1 "
	Nose only.	
Providence poor patients	15	0 pos.

Throat only, Providence, total, 473; th. + 2.3%; th. and n. = 3; total, 509.

th. + n. +, 3.6%
th. + n. —, 3.2%
th. — n. +, 6.2%

total, 13. %

8. What proportion of those exposed take the disease in your experience? (Give actual figures.)

2% = 1 (if irritants are avoided)
20 to 30 = 4

9. What proportion of those exposed, who show also the diphtheria bacilli in their throats or noses, subsequently and within a short time develop the disease? (Give actual figures.)

Such cases observed equals 3; 5%, 1; 50%, 1; 80%, 1.

10. Do you make any difference in your management of the classes of cases mentioned below? Which do you officially designate as diphtheria and which do you placard and isolate?

a.	Plac. and is., 44.			
b.	40.	Is. and wait, 1.	Is. if abundant, 1.	
c.	39.	Is. and wait, 1.	1.	No plac., 1.
d.	36.	Is. and wait, 2.	1.	Plac., 1; another cult., 1.
e.	35.	Is. and wait, 2.	1.	Plac., 1; no plac., 1; is., 1.
f.	17.			
g.	17.			
h.	1.			
i.	0.			

11. Do you test the virulence of diphtheria bacilli in doubtful cases for diagnosis?

Yes	6
Sometimes	3
On request	2
Rarely	2
When symp. and exp. both abs.	1

12. Do you test the virulence of diphtheria bacilli persisting in the throat of a recovered diphtheria patient? In what proportion of cases is this done? (Please give actual figures.)

Scientific interest only	1	
On request	8	Very few cases.
Sometimes	7	

15. Do you find any relation between the type of diphtheria bacilli found and their virulence?

Short, regular, deep-stained forms in cases without much sickness; 1 ditto found non-virulent in 17 cases, 1; aberrant forms virulent frequently; all forms

virulent sometimes; non-virulent sometimes, 1; long bacilli with irregular spots most virulent, 1.

17. Have you any evidence that the bacilli gradually lose virulence during the recovery of a case of diphtheria?

No: virulence persists if originally present, 1. No, 1. Yes, 3. Sometimes, 3. Clinical evidence, 3; some evidence.

18.

Terminate isolation, if non-virulent 8
Isolate until bacilli disappear 4

19. Give particulars of cases in your own experience where well persons having diphtheria bacilli in their throats or noses have communicated the disease to others. (Please state whether these well persons were convalescents or had not had diphtheria themselves.)

Waltham.—Several mild nasal cases, not ill, produced disease in others.

Seattle.— Believe cases are infective for some weeks (cases released ten days after membrane).

Buffalo.— Many instances. Example: child not ill, except for very slight sore throat, visited in Buffalo. Seven weeks after a severe case in family visited developed. Virulent KL in throat of visitor.

Providence.— Child with diphtheria and KL May 18 speedily recovered. KL persisted till June 20. June 11 another child (diphtheria and KL) died June 17. See Am. Rep., 1897, p. 19; 1898, p. 23.*

St. Louis.— Two epidemics due to introduction of children well but carrying KL. In one case, child came from unsanitary district, but no exposure to KL proved. This child yielded virulent KL. See *Virginia Medical Journal*, 97.

Boston.— One convalescent boy well, but carrying virulent KL, left Boston for Brockton to escape isolation. Within four days three clinical cases with KL developed in house visited.

Brookline.— Epidemic due to milk infected by healthy milker carrying KL in throat. *Journal Massachusetts Association Boards of Health*, April, 1900.

Fitchburg.— KL in throat of man delivering milk, perhaps infected from fatal case seven months previous.

Baltimore.— Two sisters, one positive, one negative, both well: negative sister developed diphtheria and KL, positive sister remained well.

Ontario.— Five men drivers were exposed to a man who had been visiting his home where diphtheria was. Five families miles apart were infected.

* Cases showing probable infection from well persons.

New York.— Child had tonsillar diphtheria. Discharged June 15. Admitted to another hospital July 2. August 17 a case of diphtheria developed in a ward not connected with the one this child was in. Clinical examination of all inmates showed nasal discharge and KL virulent in this child.

Quebec.— Well-marked cases from persons well or with slight catarrhal anginas.

Burlington.— Several cases contracted from convalescents from Brooklyn, N.Y.

Willard State Hospital.— Infection apparently carried to a distance by husband whose wife had bacilli in throat, but was well.

Letters received by Dr. Chapin referring to subject of Question 19:

Chicago, 1897.— Four cases fatal diphtheria (2 KL) in nursing infants from well mothers carrying KL in throats. Mild anginas with KL in adults a prolific means of spread. In June a single case in a school might go no further: in September 20 cases might follow.

Germantown, Pa.— Case of membranous croup and KL recovered, bathed and given new clothing, and discharged after one neg. from throat, entered Lutheran Orphan Asylum. Four days later an epidemic with KL began, involving 33 cases and one death. First victim played with recovered case immediately on return.

Ohio, San. Bulletin.— Quotes Holstrom, of Stockholm: Domestic taken ill with diphtheria traced to bacilli in throat of soldier (perfectly well) from regiment in which diphtheria existed.

Also 151 men of this regiment (786 men) showed KL, and were isolated. A daughter of one of these isolated men developed diphtheria. His wife was found to have bacilli in throat. On inquiring, it was found that this man had broken quarantine, and visited his home twice.

Minnesota.— Two always well children carrying bacilli sent to homes. Diphtheria broke out shortly after their arrival. No other source of infection discovered. One always well girl carrying KL went to her home. Step-mother and two children developed diphtheria and KL within a few days. This family was practically isolated in the country.

Minneapolis.— One case (account obscure).

20. If diphtheria breaks out in an institution (asylum, jail, school, reformatory, hospital, etc.), what is your procedure to control and get rid of the epidemic?

(*a*) Do you take cultures from all inmates present at the time of the outbreak or only from those exposed?

(*b*) Do you take cultures from all persons admitted to the institution during the course of the epidemic?

(*c*) Do you isolate all those showing positive cultures in the absence of lesions or only those with suspicious throats?

(Please state in *a*, *b*, and *c* if cultures are taken from throat only, or from both throat and nose.)

(*f*) How do you determine when it is safe to allow those exposed or infected to mingle with the uninfected inmates again?

(*g*) What precautions, other than bacteriological examinations of nose and throat and isolation of those showing positive cultures, do you consider necessary?

	A.	*B.*	*C.*	*F.*	*G.*
Baltimore	All.	Yes.	All pos.	1 neg. th.	Immunize sometimes.
Buffalo	All.	No.	All pos.	KL absent.	Notify milk dealers, sch., churches, public inst.
St. Louis	All.	Is. newcomers 2 weeks and imm., then taking cult.	All pos.	KL absent.	Imm. newcomers.
Providence	All th.	Yes, n. & th.	Yes, n. & th.	KL absent.	
Colorado	All.	Yes.	Th., yes.	KL absent, & 2 weeks.	
San Francisco	All.	No.	All pos. & susp.	KL absent, or one mo. if non-vir.	Immunize.
W. Newton Hosp.	All n. & th.	Yes.	All pos. & th.	2 neg. cult. 24 h. apart.	
Brockton	All exposed.		All pos. th.	Wait till incub. is over.	
Washington	All exposed.	No.	All pos. th.	KL absent.	
Fort Wayne	All exposed.	No.	All pos. th.	KL absent.	
Rochester	All exposed.	No.	All pos.	KL absent.	Gargles, sprays, attend to teeth; sun and out of doors.
Syracuse	All exposed or susp.	Yes.	All pos. th. *or* n.	Cults. 5 days' aft. mem. gone.	Immunize.
Massachusetts	All exposed.		All pos.	Neg. cult	
Brookline	Advise all.	Advise.			
Cambridge	Advise all.	Advise.	All pos.	Adv. 2 cons. negatives n. and th.	

	A.	*B.*	*C.*	*F.*	*G.*
Boston	Advise all.	Advise.	All pos. n. & th.	2 cons. prs. synchronous neg. cult. n. and th.	
Philadelphia	Advise all.	Advise not done.	All pos. th.	KL absent.	Immunize.
Newark	All in small inst. Exposed in large inst.		All pos.	KL absent.	
Waltham	Sometimes all exposed, all inflamed ths.	In hosp. cult. from n. and th. of all adm. to S. F. Ward.	All pos.	2 negs. from infect. parts.	
Seattle	Clin. symp. ths.	No.	Cult. from those show lesions.	10 days aft. mem.	Immunize.
Manchester	Clin. symp.; watch exp. 2 weeks.		Th. only.		
Wisconsin	Clin. symp. n. & th.	Should be fr. chronic n. & th.	All pos. n. & th.	KL abs., or 14 dys. aft. recovery.	Cult. fr. all chronic n. & th. immunize.
Fall River	Clin. symp.	Clin. symp.	Isolate suspects.	Children from houses not plac. all'd to ret. to school after 2 weeks.	
St. Paul	Depends on phys.	If possible.	Yes.	KL absent.	Immunize.
Lowell	Depends on phys.			Depends on phys.	
Los Angeles	No, isol. pt. & disinfect.		Pos. n. & th.	KL absent.	
Iowa	Isol. pt. & disinfect.	No.	No.	Clin. hist. & appearance.	
Lawrence	"				
Cleveland	"				

Springfield: isolate cases and watch for new ones. No recognized procedure. In one school, 40 cultures taken, pos. isolated, released on two negs.

No such cases:

Fitchburg.
Reading (rel. 2 weeks after memb.).
New Bedford.
Chicopee.
Camden (close sch., phys. cert.).
Lynn.

Answers obscured:

Chelsea.

Other places, no answer.

	A.	B.	C.	F.	G.
Minneapol's . . .	Isolate on symptoms.				
Oakland	Th. exposed only.	No.		Phys. statement.	Isolate and fumigate.
Columbus . . .	All exposed.	No.	Yes.		Observations by alt. phys. Isolate and fumigate.
Salem	Membrane.	No.	Susp.	Neg. cults.	
Salt Lake City . .	No experience.				
Somerville . . .	Exposed.	No.	Pos.	Phys. cert. for those infected, 2 wks. isol. without develop-m'nt of dis'se for those exp.	
Minnesota . . .	All, when possible, n. & th.	Yes, n. & th.	KL th.	1 to 3 simultaneous n. & th. cultures neg.	
Willard State Hcs.,	All n. & th.	No, unless from infected districts.	All pos.	3 negs. from n. & th. on alternate days.	Immunization.
Burlington . . .	Advise.	Yes.	All pos.	1 neg. cult.	
Quebec	All th.	Yes, but often not done.	Yes, th.	1 neg. from th.	
New York . . .	When not im. All exposed and usually all inmat. are im.	No, immunized.	All pos. unless all are im.	Cultures.	

As a matter of interest and for comparison with the above summary of answers obtained in this country, a summary of replies to three of a set of questions asked of the principal cities in Europe is appended.

These replies were made in response to a circular of questions sent out by the editor of *Annales de Médecine et Chirurgie Infantiles*, and were published in his journal July and August, 1900. The full set of replies may be found in *Pediatrics* for Nov. 1 and 15, 1900. They were called to the attention of the committee by Dr. Shea.

QUESTION 3.— What importance do you attribute to the finding of Klebs-Loeffler bacilli in the mouths of healthy individuals?

Paris.—1. Not diphtheria bacilli, if present in healthy throats.
2. Medium and long bacilli should be tested for virulence. Short bacilli are not important.
3. Dangerous.

Nancy.— Dangerous, if virulent.
Geneva.— Dangerous, if virulent.
Graz.— No importance.
Lille.— No importance.
Rome.— No importance.
Bordeaux.— No importance.
Lausanne.— Often non-virulent.
Constantinople.— May be virulent.
Berlin.— Such bacilli are non-virulent, or the persons are immune.
London.— Cases arise from well persons carrying diphtheria bacilli.

QUESTION 4.— Upon what do you base the determination of the period of isolation of diphtheritic patients?

Paris.—1. Disappearance of bacilli.
2. Disappearance of bacilli.
Geneva.— Disappearance of bacilli.
Paris.— 3. Several days after recovery.
Naples.— Two or three weeks. Advises culture.
Rome.— Fifteen to twenty days after disappearance of membrane.
Berlin.— After clinical symptoms.
London.— Three weeks after clinical symptoms.
Lille.— Eight days after clinical symptoms.
Nancy.— Until bacilli disappear or two weeks after clinical symptoms.
Bordeaux.— When general health is re-established.
Lausanne.— Three weeks.
Graz.— Five to eight days after clinical symptoms.
Stockholm.— Until bacilli disappear, but isolation is not maintained if they remain more than five or six weeks. Disease has, however, been spread in several instances by cases released after five or six weeks, when bacilli still present.

QUESTION 5.— Do you favor the establishment of special institutions for the reception of convalescent diphtheria patients because the bacilli of diphtheria are found in the throat for a long time after the disappearance of the clinical symptoms?

Paris.—1. Approves.
2. Approves.
3. Approves.
London.— Approves.
Nancy.— Approves.
Lausanne.— Approves.
Berlin.— Approves in theory, but considers impractical.
Stockholm.— Approves in theory, but considers impractical.

Bordeaux.— Approves in theory.
Geneva.— No objection.
Rome.— Superfluous.
Lille.— Superfluous.

It is evident from the foregoing summary that sufficient information was not received in answer to our inquiries to permit our coming to any satisfactory conclusion as to what should be done with persons infected with diphtheria bacilli. We therefore decided to ask the co-operation of a number of laboratory workers, in order that more exact data might be obtained, on which we could reasonably hope to base a satisfactory report.

We sent out circular letters inviting co-operation to the following laboratories: —

Cities: Baltimore, Buffalo, Boston, Brookline, Chicago, St. Louis, San Francisco, Worcester, Newton, Providence, Pittsburg, Philadelphia, Washington, Rochester, Syracuse.

States: Minnesota.

Provinces: Ontario, Quebec.

Hospitals: Willard State, Johns Hopkins.

Promises of help were received from Providence, Brookline, Newton, Lowell, Worcester, Springfield, Minnesota, Washington, Ontario, Boston, Willard State Hospital, and from Dr. Theobald Smith.

At present we are waiting until the winter's work slacks up sufficiently to give time for these examinations, and mean time we are trying to get the whole matter well organized.

Meanwhile the committee regrets to have to ask for another extension of time while the investigation is in progress.

THE CHAIRMAN.— The report of the committee is now before the Association for discussion.

DR. PALMER.— Mr. Chairman, I should like to ask Dr. Hill a question in regard to those cases reported as having the germs in the throat, but as not having been exposed, and being regarded as well persons. Does he know what classes of cases were tested? What I mean is, Were they school-children or were they ordinary people about their daily work?

DR. HILL.— The best figures we have were from Dr. Chapin, so I will ask him to say exactly where they came from.

DR. CHAPIN, Providence.— I think nearly all classes of people were represented. A good many of them were persons in institutions, but there were a good many children in public schools. At the time, there was diphtheria in the city. Most of the bacilli were found in institutions, comparatively few among school-children.

THE CHAIRMAN.— Has Dr. Prescott any experience he would like to mention?

DR. PRESCOTT.— Dr. Durgin wants me to tell of the experience I had in the Little Wanderers' Home this winter.

Just before Thanksgiving a child came in from one of the suburban towns, and at the end of twenty-four hours was sent to the hospital as a case of virulent diphtheria. That was on a Thursday. On Monday the assistant matron and another child came down with diphtheria, and were sent to the hospital. I then began to take cultures from all the children. For reasons of the government of the Home, I did not give them antitoxin, although I believe that would have been a good thing to do. After the first round was made, we obtained between 20 and 25 positive cases of diphtheria, with a number of cases that are called "Culture Requested." Those are cases where the germ is similar to the KL bacillus, but is not exactly the same; and we thought that in an institution the cases should be isolated. So they were all isolated, just the same as the positive cases were. We kept on taking cultures, through the courtesy of Dr. Hill, who provided us with all the serum we wanted. He must have been very tired before we got through, because he was running the Parental School at the same time; and he had 1,500 cultures there, and almost as many from our Home. But I am happy to say that in six weeks every positive case was cleared up, and we have not had a case of clinical diphtheria since the one was sent to the hospital on the Monday after the first case appeared. I think that shows the advantage of isolating all these cases.

DR. SHEA.— Mr. Chairman, I should like to ask Dr. Prescott how many of those 25 cases they found developed into diphtheria.

DR. PRESCOTT.— We never had a case develop into diphtheria.

I said we did not have a clinical case of diphtheria from the time the second group of cases went to the hospital. That was on a Monday. But we kept on taking cultures between five and six weeks, and once in every little while a patient who had never had bacilli in the throat before would have the bacilli; and then we would have to have that child upstairs, and kept upstairs until we got two negative cultures.

DR. SMITH.— Mr. Chairman, I should like to ask Dr. Prescott what the relative virulence of those bacilli was.

DR. PRESCOTT.— I don't know: perhaps Dr. Hill can tell. I don't think he had time, though, to do anything of that sort.

DR. HILL.— The work came too fast this year, Dr. Smith. We could not pretend to handle that point.

DR. PRESCOTT.— There was not any question of the two cases that went to the hospital; and the case that came in first was a patient that was very sick with diphtheria, and there was no doubt of the virulence of the germs. No patient died. As a matter of fact, no patient that I have had go to the hospital has died since antitoxin came in. I consider that, if you give sufficient antitoxin within twenty-four hours from the time of the first symptoms, there is very little danger of the patient's dying.

THE CHAIRMAN.— The subject is still open for discussion.

A MEMBER.— I should like to ask if this committee made any inquiries in regard to a systematic use of antitoxins or prophylactics or, where one case broke out in a family, if anything was done in the way of using antitoxins or prophylactics for the rest of the family.

DR. CHAPIN, Providence.— Mr. President, we thought our field was large enough without taking in the question of antitoxin. We did not consider that at all.

DR. HILL.— One man did make a note on that, and said that out of sixty-six positives only three developed the disease. These three died. He immunized all the others at once, but for some reason his antitoxin gave out; and these three escaped immunization and came down with and died of the disease, but none of the other positives developed it. It was not in reply to a question, but was volunteered.

DR. GOODWIN.— I was going to ask Dr. Hill or Dr. Chapin, where

the practice is that they require two negative cultures, how much time is supposed to elapse between the taking of the first and the second culture.

DR. HILL.— We simply require that they should be on different days, that is all. The average time is about two to three days. It would depend, of course, on the physician who acts as medical agent.

DR. WORCESTER.— Dr. Hill, in Boston the second culture is made by your examiner?

DR. HILL.— By our agent, a physician.

DR. WORCESTER.— I should like to ask Dr. Prescott whether, in these twenty-five or thirty cases that showed the presence of Klebs-Loeffler bacilli after the first cases that developed diphtheria, antitoxin was used.

DR. PRESCOTT.— No antitoxin was used at all.

DR. WORCESTER.— I did not understand. I wanted to be sure about that.

DR. PRESCOTT.— I contented myself with taking cultures and isolating them, and not using antitoxin. If I had my own way, I should give antitoxin to every child in the Home as soon as a case appeared, and to every applicant of the Home before it was admitted to communion with the rest of the children, as they do at the Children's Hospital. I think the experience there has definitely proved that antitoxin is a preventive of diphtheria starting up in a hospital. They have had but one case come up in several years since they have given to every child who has been admitted a dose of antitoxin.

DR. CHADWICK.— Waltham had an experience which would be of interest in this regard. We have had an epidemic there since the beginning of the school year. In fact, we have had over 400 cases since the first of February. About 250 of those have been since the opening of the schools in September. The epidemic gradually became greater and greater, till about the first of December we had about 50 patients in Waltham, which has, as you know, about 24,000 or 25,000 population and about 4,000 school-children. At about the first of December, school inspectors were appointed; and every school child in both the public and private schools was examined, and cultures taken from each one that showed a red throat or a nasal discharge.

From those cultures 22 showed the Klebs-Loeffler bacillus. Some of these children had very slight evidence of disease, only a red throat or, possibly, a very slight nasal discharge. These were excluded and quarantined in all except one or two instances, where the evidence was so slight that we simply excluded the child from school until two negative cultures were obtained. The result of that has been very remarkable, I think, in stopping the epidemic. At the present time we have only about 12 cases in town. In several instances we have found, or feel confident, at least, that these children that had very slight evidence of disease — in fact, no evidence except the redness of the throat or the slight nasal discharge — were the cause of several cases of severe diphtheria.

THE CHAIRMAN.— I think it might be very interesting to the Association to have Professor Smith state his opinion in regard to the different degrees of virulence between the bacilli found in persons sick and on recovery, and also between those having the clinical symptoms and those without. Dr. Theobald Smith.

DR. THEOBALD SMITH.— Mr. President, I think that you have given me rather a large programme. I feel that I am quite unable to answer all the questions proposed. I have been a rather close student of the diphtheria bacillus for the last five or six years,— but mainly from the laboratory point of view,— and the question of relative virulence has been of special interest to me. It is a problem which applies to all bacteria, and of course it is a very important one when applied to the diphtheria bacillus. In 1896 and 1897 I tested very carefully, with all the methods then at our disposal, about 42 different cultures which came from different parts of the State to the laboratory of the State Board of Health. This test was made in such a way that we were able to determine the difference between the toxin-producing power of the different bacilli. It was easy to classify the bacilli into such as produced a very large amount of toxin (which formed a very small class), such as produced a medium amount of toxin, and those which produced a slight amount of toxin; but all of the 42 were virulent bacilli, and they had all the characteristics of the virulent type. There were 4 others isolated, which, with the microscope, were classed as pseudo-diphtheria bacilli, and also

proved to be such when they were tested. At that time I almost doubted that there were non-virulent bacilli which closely resembled true diphtheria bacilli under the microscope, but last year Dr. Denny sent me a culture taken from a patient quarantined for some months. I examined the culture with the most improved methods at our disposal, and found it absolutely without virulence. There was not the slightest effect upon guinea pigs from the large doses that were injected. Soon after another case came under our observation. Dr. Richardson, from Marlboro, had a case in which the bacilli were in the throat fully five months after the patient had recovered from a mild case of diphtheria. I tested the bacillus from this case also by passing it through a series of cultures in order to augment the toxicity, then tested it, and found not the slightest trace of toxicity, although these bacilli had all the characters of the true diphtheria bacillus. I think that one of the important things for the committee to do is to include the matter of testing the virulence and toxicity of diphtheria bacilli in their programme. It is not an easy task, and all laboratories should contribute to this work. I shall do my share of it. I hope to test all the cultures of bacilli that reach me from throats that are found without disease, and also those that are running more than three months after all traces of disease have disappeared. I think in this way we may be able to come to some conclusion as regards the relative virulence of bacilli and its possible disappearance. The question is, at best, a complicated one. The admirable report of the committee shows this very clearly, and it seems to me that there is a great deal still to be discovered.

To return to the illustration that Dr. Prescott gave, I think it is a most remarkable one. If there were 25 cases in which certain bacilli were present in the throat without subsequent disease, it seems to me almost a proof that these bacilli cannot produce diphtheria. At least 50 per cent. of such cases should come down with diphtheria later on, as, I think, has been observed in European institutions where diphtheria bacilli were detected at the beginning of an epidemic, and where such infected cases, slowly one after the other, came down with the disease afterwards. It is a problem which I think cannot be solved at present why 25 individuals, in the earlier years of life, and hence the most susceptible, should have diphtheria

bacilli in their throats, morphologically speaking, and yet have no disease. I regret that the link in the chain of evidence which refers to their toxicity is not at hand.

I think there is one point, if I may be allowed to digress from the questions that have been propounded to me, that this Association should take up; and that is a popular instruction in regard to the manner in which children should take care of their fingers and their mouths and noses in their association with one another. I doubt whether the problem of diphtheria is ever going to be solved unless we begin at that end as well. It seems to me that it is a subject which is pertinent for preventive medicine to take up; namely, the popular instruction, among the children of the State, concerning the manner in which the bacilli may be transmitted from case to case.

MR. COFFEY.— Mr. Chairman. Dr. Smith, I should like to ask you a question, if you please. Have you formed any opinion as to what effect these non-virulent bacilli might have upon the human throat if it was exposed? In other words, these non-virulent bacilli are tested upon guinea pigs. Might it not be possible that they would not affect a guinea pig, but, if a child of susceptible age was brought in contact with the bacilli, it might be affected? Had you formed any opinion as to that?

DR. SMITH.— I think — my opinion is based upon a long experience with pathogenic bacteria — that those bacilli would be harmless to children. It is not a question which we can demonstrate, because the human subject should not be experimented upon: hence we have to use the data which come to us from the study of other infectious diseases. I am fairly convinced that those diphtheria bacilli which produce trace of disease on guinea pigs, when injected in large doses, are harmless to man.

DR. HILL.— If I may ask Dr. Prescott a question. Do you remember, doctor, about those 25 positives, whether they were those cards marked positive or those marked doubtful?

NOTE.— In conversation with Dr. Prescott, after the meeting, he consented that I should add here the fact that these 25 positive cases not sick were all exposed to the sick diphtheria cases. Since the Little Wanderers' Home contains about 100 inmates, and all of these were exposed, these 25 positive cases formed about 25 per cent. of the total exposed. Now Dr. Chapin, of Providence, has

shown by figures extending over several years that those exposed, who have diphtheria bacilli in their throats, form usually about 50 per cent. of the total exposed persons. About one-half of these develop the disease, the remaining half (one-fourth, say, of the total number exposed) remain well. This Little Wanderer epidemic is peculiar, then, not so much because 25 per cent. of the exposed were infected, but because another 25 per cent., which might have been expected to be infected, escaped, and the 25 per cent. infected failed to develop the disease. The presumption is that these persons are immune, since the virulence of the bacilli, coming from clinical cases, may be considered as very probably existent, certainly, in a large proportion of these well persons exposed and carrying diphtheria bacilli.

DR. PRESCOTT.— I only spoke of those marked positive. Of those marked "C. R." I don't remember how many there were. I guess every child there had "C. R." some part of the time. There were between 100 and 115 children in the Home; and I think the larger proportion of them were "C. R." at some time.

DR. HILL.— I might say that about half of the Parental School children gave "C. R." cultures. On going out there after them, I found that some of the children were packed in the rooms where they slept. Really, you could walk all over the room on the beds without any danger of touching the floor. It was from those rooms that we got this particularly large number of "C. R.'s." That is to say, if three or four boys in the lot had it to start with, there is every reason to believe it would be spread to every one else in the room within a few hours.

MR. COFFEY.— What is "C. R."?

DR. HILL.— "C. R." is our laboratory abbreviation for "Culture Requested." That is, if a culture for diagnosis is uncertain for any reason, we ask for another culture. In the case of epidemics in institutions, "C. R." always means the presence of that organism which was often called the "nose bacillus" in previous days, and which we now call for short the "double-header." It occurs in a double cone shape, two cones with the bases together; and a great deal of work and discussion has been caused by it. The latest work seems to show that it is at least connected with the diphtheria bacillus,— that is to say, that it may be usually a non-virulent form of it, but that it is sometimes virulent,— and, therefore, we consider that in institutions, on the chance of its being virulent, it is better not to take

those chances, but to isolate the person carrying it. When it comes to us for diagnosis, we simply request another culture. We don't call it positive when the culture is for diagnosis.

DR. PRESCOTT.— We isolated all those cases just as if they were positive cases, but we did not keep them as long isolated if the next culture was reported negative.

DR. CHASE.— Mr. President, I might say just a few words in regard to the case Dr. Smith referred to, of bacilli sent in by Dr. Denny from Brookline. I know something about that case, for I was one of the two physicians who saw it. The child had the clinical signs of diphtheria, and also had some fever and other symptoms, so that the nurse was employed for a number of weeks. When the culture was sent for Dr. Smith's opinion, the child had been quarantined, I think, some ten weeks; and that is Dr. Denny's recollection also. Two weeks after that,— twelve weeks,— the child was released, and allowed to go to school. We wanted first the opinion of one of the highest authorities of the State before releasing it from quarantine. At that time we had made our guinea pig tests in the usual way, and found no virulence, as far as the pig would show it. But such cases as that are constantly arising, not only in our town, but in every town; and I should be sorry if we should go away this afternoon without any practical results, any help, from Dr. Smith's remarks to us. If it is in order, Mr. President, I should like to make a motion, if that is the way to bring it about, that Dr. Smith be requested by the Association to prepare for us a circular of suggestions on those two points that he referred to specially: first, how we are to determine the virulence of the germs,— we are doing it now in our way in Brookline,— and the other question, what we shall do when we find the germs are non-virulent, whether let that child return to school at once or keep him at home, and let his brothers and sisters return. We want his knowledge for our guidance on that; and then the other matter he referred to, in what way can these children prevent exposure to themselves and others by their hands, etc. I think it would be a very valuable thing for all of us if we had the benefit of Dr. Smith's knowledge. So I would like to make that motion, Mr. President, that such a circular be prepared. I will not give you the wording of it. I should like the President to express the wording of it. I think you have the idea.

DR. PRESCOTT.— I second the motion.

DR. SMITH.— I should like to state that the committee that now has this matter in charge is, in my opinion, perfectly competent to take up these problems. I shall do what I can in my small way to assist it, but I think the committee is fully able to manage them. The testing of diphtheria bacilli is a matter which takes some time, and there might be some short method worked out which would simplify the testing of the virulent bacilli. I hope to assist in working on this matter whenever time allows, but I think there are others in a position to carry on such investigations. At any future time we can compare notes as to the best methods that have been worked out. It seems to me that, if the Association wishes to have any such circular drawn up, it should be referred to the standing committee on diphtheria.

DR. CHASE.— Mr. President, I withdraw that motion.

THE CHAIRMAN.— Are there any other remarks to be made upon this report?

DR. CHASE.— Mr. President, will it be understood that the committee already in existence will assume that in addition to its present duties? If not, I move that that shall be done.

THE CHAIRMAN.— You hear the motion of Dr. Chase, that the additional duty mentioned shall be added to the duties of the already existing Committee on Diphtheria Bacilli in Well Persons. Does any one second the motion?

The motion was seconded by Dr. Prescott, and adopted.

Dr. Chase offered the following vote, which was unanimously passed: —

Voted, That, recognizing the ability of the Committee on Diphtheria to deal with every aspect of the question, the said committee is requested: —

(1) To prepare a few suggestions that health officers may print as a circular and issue to parents, teachers, and others for their instruction in the hygiene of children with special reference to their protection from diphtheria. These suggestions, as recommended by Dr. Theobald Smith, should emphasize the importance of clean hands before eating, and such other measures as the committee may deem of value.

(2) To prepare for the guidance of health officers suggestions as to the importance of testing, as quickly as practicable, the virulence of bacteria bacilli in persons in whom the clinical symptoms have been very slight or entirely lacking, thus preventing, whenever possible, much unnecessary expense and hardship.

THE CHAIRMAN.— Does any one move the continuance of this committee as asked for?

DR. PRESCOTT.— I move the continuance of the committee as asked for.

The motion was seconded and adopted.

THE CHAIRMAN.— Is the Committee on Nominations ready to report?

MR. PILSBURY.— Mr. President, there being a long list of talented gentlemen comprising the membership of this Association and having the necessary qualifications, the committee took considerable time in order to prepare its report, for which we trust we may be forgiven. A majority of the committee desires to assume the responsibility of having nominated one of its own members as a candidate for office. I say this in deference to the gentleman's modesty. The committee presents the following report: —

LIST OF NOMINEES.

President.

HENRY P. WALCOTT, M.D.

Vice-Presidents.

SAMUEL H. DURGIN, M.D. SAMUEL W. ABBOTT, M.D.

Secretary.

JAMES C. COFFEY, of Worcester.

Treasurer.

JAMES B. FIELD, M.D., of Lowell.

Executive Committee.

(For two years.)

W. H. CHAPIN, M.D., of Springfield. F. W. KENNEDY, M.D., of Lawrence.
D. S. WOODWORTH, M.D., of Fitchburg. W. S. EVERETT, M.D., of Hyde Park.
WALTER C. KITE, M.D., of Milton.

On motion of Dr. Prescott, duly seconded, it was voted that the Secretary be authorized to cast the ballot of the Association for the list of officers thus nominated.

THE CHAIRMAN.— The next paper on the programme is: —

ON THE DRAINAGE, RECLAMATION, AND SANITARY IMPROVEMENT OF CERTAIN MARSH LANDS IN THE IMMEDIATE VICINITY OF BOSTON.

BY WILLIAM LYMAN UNDERWOOD,

LECTURER IN THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND MEMBER OF THE BOARD OF HEALTH OF BELMONT.

It has long been recognized that the existence of "wet, rotten, and spongy lands" in the near neighborhood of towns and cities may constitute a menace to the public health; and special attention has been drawn to such areas within the last three years, since it has been established with tolerable certainty that the mosquitoes for which they too often furnish a breeding-place may become effective vehicles of malarial or intermittent fever. In almost every town in the State are to be found undrained areas of wet, sour, and swampy lands which in many ways are a nuisance and more or less injurious to the public health. Pools of stagnant water are frequently found upon them, in which may be bred myriads of mosquitoes whose existence in any neighborhood is a damage quite apart from the fact that they may in all probability become the effective carriers of the germs of intermittent fever.

From such areas arise foul odors of decaying vegetation; and in the colder months of spring and fall the air, heavily laden with moisture, tends to impart to the surrounding neighborhood a cold and penetrating chill detrimental to the public health. Frequently these lands cover a very large tract whose ownership is divided among many individuals. Very often the territory may cover lands lying in separate though contiguous towns.

The question arises, How can these conditions be remedied or the dangers from them be minimized? If it is possible to drain these spongy lands and so bring the soil back to a sweet and wholesome condition, who is to do the work, and at whose expense is it to be done? An individual owner generally cannot work to advantage unless he has the co-operation of his neighbors. How to bring about a

unanimity of purpose and action on such a question is often a very difficult problem to solve, especially when it involves the possibly conflicting interests of two or more different towns. While it may in most instances be impossible to obtain concerted action through individuals, there is fortunately, if properly applied, a method by which much good may be effected; and that is through the local board of health — if the lands in question lie within one town — or by the united action of the boards of health of two or more towns whose interests are involved, provided it can be shown that the areas in question are detrimental to the public health. The laws which the State of Massachusetts has enacted to deal with such conditions are positive and plain, and briefly as follows: —

Lands which are wet, rotten, and spongy, and offensive to persons residing in their vicinity, or which are injurious to the public health, may be deemed a nuisance; and, upon a hearing and petition, such nuisance may be abated. A board of health may also determine who shall bear the expense of making such improvements and the keeping of them in repair, whether it shall be the city, town, or persons benefited thereby.

As a single illustration of what has already been accomplished along these lines in one case, and to show that still further steps seem absolutely necessary for the safety of the public health, a tract of territory will be considered, situated within five miles of the State House in Boston, lying in and between the cities of Cambridge and Somerville and the towns of Arlington and Belmont, and known as the "Fresh Pond Marshes." It is the purpose of this paper to describe and illustrate the condition of these marshes as they now exist and as they existed before certain sanitary improvements recently made by the Boards of Health of Belmont and of Cambridge had been carried out. In order to give a clear idea how these conditions were brought about, it will be desirable to state a few facts concerning the early history of the Fresh Pond Marshes.

In 1856 the Cambridge Water Company first began to use the waters of Fresh Pond for the city supply, and their charter also granted them the right to take the waters from Little and Spy Ponds and Wellington Brook. During that year F. W. Bardwell (a member of the Lawrence Scientific School) was employed to ascertain the

amount of water available for the city's use. He made careful calculations, and found that the average discharge from Fresh Pond and through Alewife Brook (see map) was a little over 2,000,000 gallons daily. From Spy and Little Ponds and Wellington Brook it was about 10,000,000 gallons daily. He reported that by building a dam across the culverts under the Lexington Branch Railroad the waters from these ponds and the brook could be forced back into Fresh Pond. It is not clearly shown just when Fresh Pond began to be supplied in this way, but it was probably some time before it became necessary to do so. In a report of 1870, however, the following appears: —

"A new gate and gatehouse have been built at the outlet of Fresh Pond, and flashboards have been erected on Alewife Brook where it passes under the Lexington Branch Railroad. These flashboards were rendered necessary, not only to secure the water flowing from Spy and Little Ponds, by conducting it into Fresh Pond, but also to enable the fish to escape from the pond to the ocean. There had been no water flowing from Fresh Pond for several months, while there was a constant flow from Spy and Little Ponds. By the dam at the railroad crossing the tide is effectually shut out from all the ponds, and the water from Spy and Little Ponds is carried directly into Fresh Pond."

This system was evidently used until 1873, when two sewers were allowed to empty into Alewife Brook,— one at Spruce Street and another at Concord Avenue. In order to avoid contamination of the water supply of Cambridge by their sewage, the outlet of Alewife Brook was then permanently closed by filling in with dirt, and sheet piling was driven in across the brook at Concord Avenue. As a further safeguard, tide-gates were built at Broadway in Somerville, to prevent the tide-water from backing the sewage upon the meadows. As Cambridge, however, could not afford to lose the amount of water which she had been getting from Little and Spy Ponds and Wellington Brook, she built in 1875 a conduit to carry this supply directly from those ponds and Wellington Brook into Fresh Pond. (This is shown upon the map.) For a number of years this system appeared to be satisfactory; but, with the rapid increase in the population of Cambridge, it soon became evident that a larger water

supply was necessary. It also became clear that the conduit water was being badly polluted; for Wellington Brook, with its drainage area of 2,500 acres (the greater part in a state of high cultivation and heavily manured), was becoming a serious danger. In 1879 the Cambridge Water Board had borings made all over the territory between the meadows and Fresh Pond. As a result, they found a rapid undercurrent of water setting from the marshes to the pond; and in their report for that year they stated that it was very important that these meadows should be kept clean, in order to avoid contamination of the public water supply. The marshes are to-day in a worse condition than they were then, and, if the opinion of the Water Board was correct, must still menace the purity of the waters of Fresh Pond. To avoid further contamination and to meet the growing demand, Cambridge in 1887 began to take its main supply from Stony Brook in Waltham, and Little and Spy Ponds and Wellington Brook were abandoned as sources of water supply.

The condition of the meadows at this time, from a sanitary point of view, was far from satisfactory. Naturally, the channel of Wellington Brook, through disuse, had become considerably obstructed below the point where its water was diverted by the conduit. Rank weeds and other growing vegetation in some places completely filled the bed of the stream. For a number of years the farmers had entirely neglected the land in this vicinity. Prior to 1880, and as long as the ice business of Fresh Pond was in a flourishing condition, these marshes were cared for, the channels of the brooks were annually cleaned out, and the whole meadows thoroughly ditched. Heavy crops of meadow hay were harvested from them, and found a ready market with the ice-men, who used large quantities for packing in their ice-houses. The Fresh Pond Ice Company alone bought 100 tons of hay a year, frequently paying as high as $20 a ton for it. In 1888 the last ice-house was removed from the pond, and from that time until the present (a period of some twelve years) no attention has been paid by the owners to the drainage of this large territory. Year by year the water has been rising higher and higher upon the fields until stagnant pools have come to exist all summer long, and offensive odors of decaying vegetation are given off where twenty years ago crops of good meadow hay were cut annually. Malaria has

FIG. 1.— A 10-inch pipe located in Belmont, 700 feet from the Cambridge line. Through this pipe was flowing, on July 27, 1900, all the water from Wellington Brook at that time. The bridge on Hittinger Street was being repaired, and the water was temporarily cared for in this way. It will be seen that a much smaller pipe would have answered the purpose. (Compare this with Figure 4 taken on the same day.)

FIG. 2.— Looking south-east, from bridge on Hittinger Street, July 27, 1900, showing pool in Belmont into which the water from the 10-inch pipe shown in Figure 1 was flowing. This pool was 3 feet deep, and well indicates the lack of proper drainage.

FIG. 2*a*.—The same place shown in Figure 2, Nov. 22, 1900, and after heavy rains. It will be seen how the water has been lowered in spite of the rains and drawn off by simply clearing out the channel in Cambridge territory. On the right bank will be noticed the roots of the rushes which are to be seen in Figure 2 growing luxuriantly.

FIG. 3.— July 27, 1900, looking east from Wellington Street. The channel of Wellington Brook is filled with rushes. Within half a mile, in Belmont, is a school-house from which there are more absences relatively from sickness than from any other school in that town.

FIG. 3*a*.— Nov. 22, 1900, same view as above, after the new channel had been made.

FIG. 4.— July 27, 1900, a 4-foot pipe and culvert under the Fitchburg Railroad and Central Massachusetts tracks, 1,200 feet below the 10-inch pipe shown in Figure 1. This pipe was standing almost full of water, while the 10-inch pipe further up the stream was not half filled, though carrying all the flow of Wellington Brook. At the lower end of the culvert rushes were growing and filling the channel. These and other obstructions further down the stream were holding the water back and keeping the pipe full.

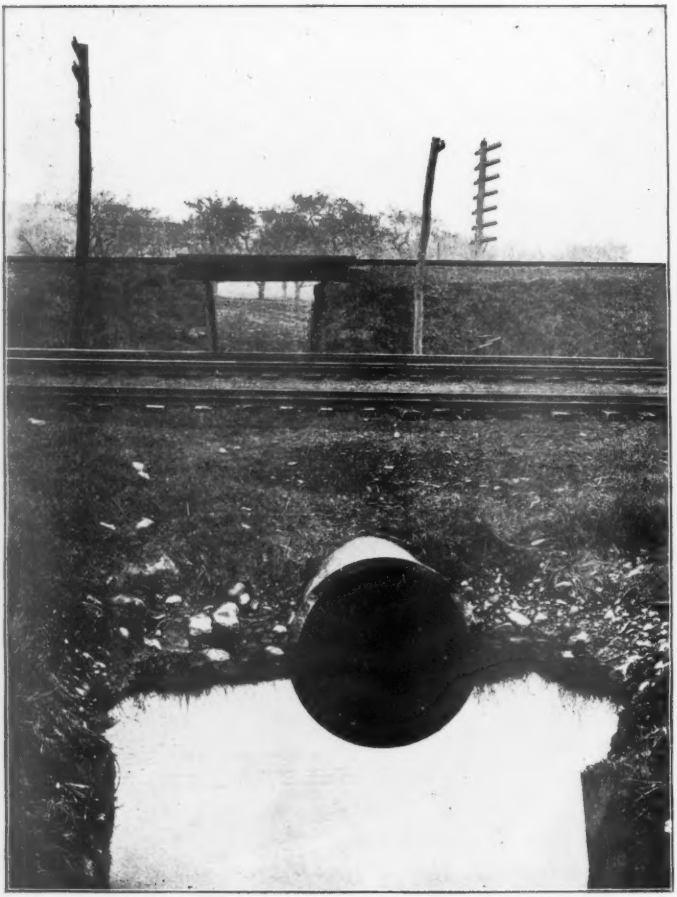

FIG. 4*a*.— Nov. 22, 1900, from the same point as Figure 4, but after the channel had been cleaned out. It will be seen that the pipe is but half-full of water, though the view was taken after a heavy rainfall. When the brook was first cleared out, there were only five inches of water flowing through the culvert.

FIG. 5.—July 27, 1900. An obstruction of willow-trees growing directly in the bed of Wellington Brook. The surface of the water is covered with a thick scum of duckweed, with the exception of the dark space in the centre, into which, just before the picture was taken, a stone had been thrown.

FIG. 5*a*.— Nov. 22, 1900. From the same point as Figure 5, but showing the new channel. Just beyond the willow-tree and to the left was situated formerly the gateway that carried the water through the conduit into Fresh Pond. (See map.)

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erly
See

SKETCH MAP
WELLINGTON
APPROXIMATE SCALE
MARSHES
NEW CHANNEL CUT DURIN
SUMMER OF 1900
OLD CONDUIT ABANDONE
BELMON
WELLI

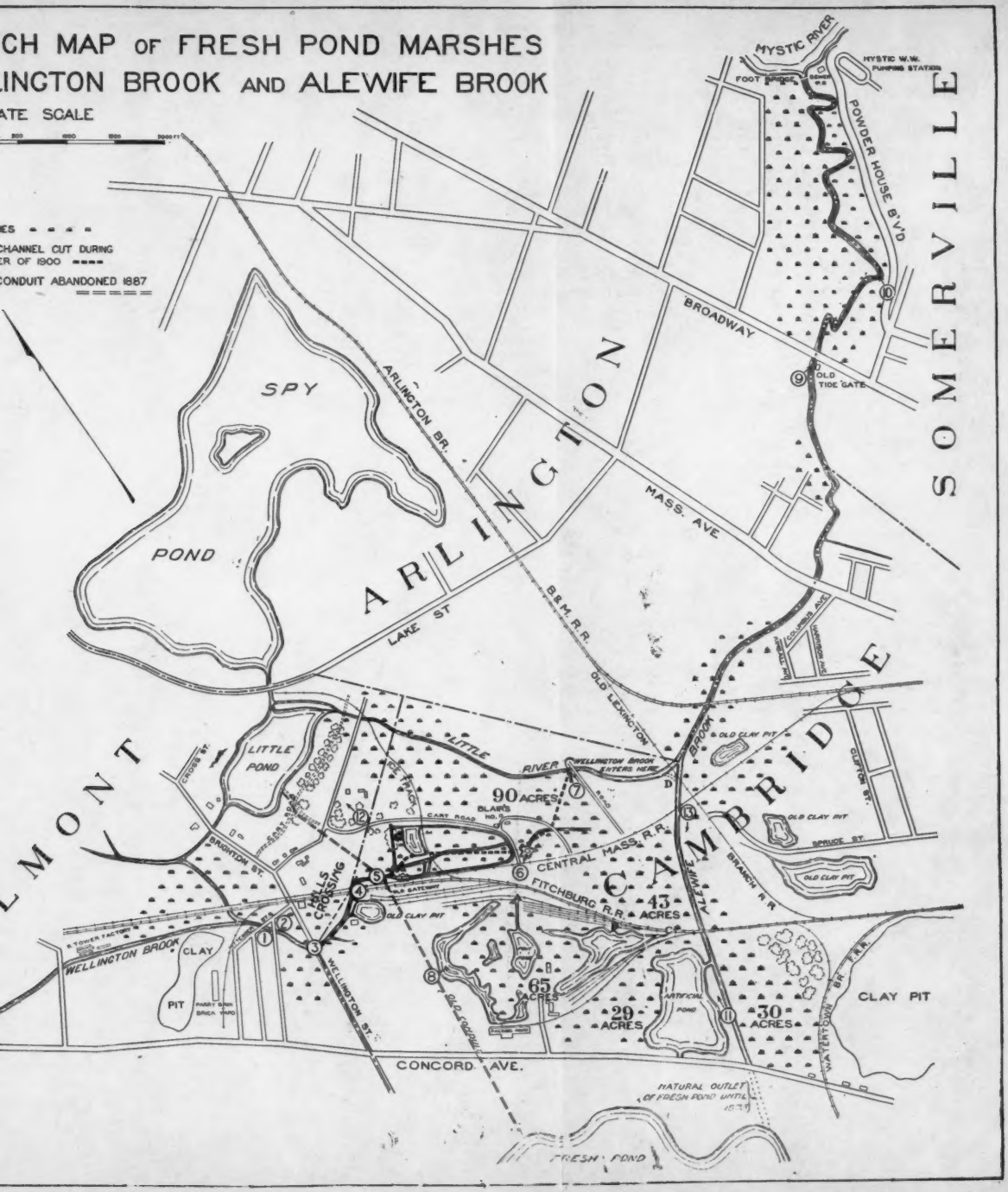
CH MAP OF FRESH POND MARSHES
LINGTON BROOK AND ALEWIFE BROOK
ATE SCALE
CHANNEL CUT DURING
ER OF 1900
CONDUIT ABANDONED 1887
MYSTIC RIVER
MYSTIC W.W. PUMPING STATION
POWDER HOUSE B'V'D
SOMERVILLE
BROADWAY
OLD TIDE GATE
SPY
POND
ARLINGTON BR.
ARLINGTON
MASS. AVE
LAKE ST
B&M R.R.
OLD LEXINGTON
LITTLE
POND
LITTLE RIVER
WELLINGTON BROOK ENTERS HERE
90 ACRES
BLAIR'S
CART ROAD
CROSS ST.
BRIGHTON ST.
CROSS'S CROSSING
CENTRAL MASS. R.R.
FITCHBURG R.R.
ALEWIFE BROOK
BRANCH R.R.
CAMBRIDGE
OLD CLAY PIT
CLIFTON ST.
SPRUCE ST.
43 ACRES
WELLINGTON BROOK
CLAY
PIT
WELLINGTON ST.
65 ACRES
29 ACRES
ARTIFICIAL POND
30 ACRES
WATERTOWN BR. R.R.
CLAY PIT
CONCORD AVE.
NATURAL OUTLET OF FRESH POND UNTIL
FRESH POND

FIG. 6.— July 27, 1900. A stagnant pool, the surface of which was covered with green scum. After the new channel was constructed, this pool was lowered about 2 feet. In the winter of 1899–1900, on a number of occasions, the water in this vicinity rose so high that it covered the roads and prevented children living at Blair's house (see map) from attending school.

FIG. 7.— July 27, 1900, the mouth of Wellington Brook where it enters Little River. From this point to Wellington Street the new channel was constructed. It will be seen, by referring to the map, that here the stream had become completely obstructed. For some distance the water of the brook had to soak its way through the soil to Little River.

FIG. 8.— Dec. 8, 1900, looking east, and showing conditions still existing at the worst spot on the marshes. In this section there are 65 acres, bounded on the north by the tracks of the Fitchburg Railroad, on the east by the tracks to the factory of the Boston Packing and Provision Company, on the south by Concord Avenue, and on the west by high land, from which this view was taken. Most of this territory is under water throughout the entire year. Formerly the greater part of it was covered with a growth of maple-trees, but these have all been killed by the gradually rising water. At points *A*, see map, directly under 6, and *B* (more to the right), culverts used to drain this section into Wellington Brook; but now these waterways have been filled in, and the only outlet is at *C* (see map, point on railroad tracks north of Artificial Pond). From the north side of the Fitchburg Railroad tracks, at this point, the water has to find its way across the marshes as best it can: for there is no channel for it.

FIG. 9.— The old tide-gate house, at Broadway, in Somerville. Built in 1872 and abandoned in 1896.

FIG. 10.— Looking north from Powder House Boulevard, and showing marshes between Broadway and the Mystic River. If tide-gates were constructed at the point where the foot-bridge crosses Alewife Brook (see map) near its junction with the Mystic River, this marsh land could be changed into a lagoon, in which the brook waters could be stored during the period of high tide in the river. By this means it is probable that the water-table of the Fresh Pond marshes could be lowered 3 feet.

FIG. 11.— The shore of Artificial Pond. (See map.)

FIG. 12.— A view near the marshes, showing the agricultural possibilities of this locality.

FIG. 13.— The unreclaimed portion of the marshes as it exists to-day. Looking south-east from the Massachusetts Central tracks, December, 1900. Within half a mile of this swampy area there are located 1,161 dwelling-houses. 128 of these are in Belmont, 201 in Arlington, 307 in Somerville, and 525 in Cambridge.

FIG. 14.— Looking east along the south bank of Wellington Brook, in Belmont, about a quarter of a mile above the point where it passes under Concord Avenue. The brook is hidden by the shrubbery to the left. In the lower right-hand corner is seen a portion of a lily pond, and in the background is a meadow kept sweet, dry, and fertile by means of proper drainage.

FIG. 15.— The lily pond, a part of which is shown in Figure 14. Here are grown aquatic plants, including six hardy varieties of water lilies that bloom from May to October, and require no special care. In the water are hundreds of gold-fish that feed upon the larvæ of mosquitoes, and serve to keep this insect pest in check. In such ponds these fish thrive and multiply, surviving even the coldest winters of the locality.

Figures 14 and 15 illustrate what might be accomplished on the Fresh Pond marshes by proper drainage and care.

crept in, and the whole district has threatened the health of the surrounding towns. It was this condition of affairs that the Board of Health of Belmont was called upon to investigate.

It was at once apparent that the town by itself could take no effective steps to alleviate the trouble, as the backing up of the waters of Wellington Brook upon Belmont lands was due to obstructions further down stream within the limits of Cambridge. Co-operation with the Board of Health of that city seemed to be the only remedy; and early in the fall of 1900, through the united action of the Boards of Health of Cambridge and Belmont, a considerable area of worthless and unwholesome territory in the vicinity of Hill's Crossing was readily and successfully reclaimed.

For this purpose a broad new channel, 10 feet wide and 4 feet deep, was constructed from the point where Wellington Brook enters Little River to the Belmont line, a distance of half a mile. This has so thoroughly drained the immediate district that the water level has in some places sunk more than 40 inches. Farther up the stream in Belmont, lands which were under water last summer — one of the dryest seasons in many years — have been so thoroughly reclaimed that they are now dry and available for cultivation. The map and photographs will serve to show the extent and character of this work better than any merely verbal description could possibly do, and to them the reader is referred for detailed information.

The work which has already been done through the combined action of the Boards of Health of Cambridge and Belmont has cost about $1,600, of which Cambridge's share was $1,100, and Belmont's $500. No assessment upon any of the landholders has been made by either of the boards, as it was held that these unsanitary conditions were brought about through natural causes, and that their removal was for the common good of the public at large.

While Belmont has no further cause of complaint in so far as her own lands are directly concerned, that town is nevertheless near enough to a portion of territory which still remains undrained to feel its evil effects. It is to be hoped that some method will soon be devised whereby the towns and cities chiefly concerned (Belmont, Arlington, Cambridge, and Somerville) may co-operate and adopt some definite measures concerning the sanitary treatment of these lower

marshes for their mutual benefit, and also for the benefit of the public at large, as the condition of these may materially affect the health of other near-by towns.

There is still much to be done before some of the neighboring territory can be brought into a healthful and useful state. To accomplish this, the co-operation of Arlington, Somerville, and Cambridge with Belmont is indispensable. The placing of tide-gates at the mouth of Alewife Brook where it empties into Mystic River would remedy existing evils at comparatively small expense. This whole neighborhood possesses many natural beauties, and, if developed, could be made wholesome and attractive, instead of what it now is, an unsightly area of waste and swampy lands, and a menace to the public health.

A map of the Fresh Pond Marshes and some of the contiguous territory has been prepared under the author's direction, and is shown above. The boundaries of the cities and towns immediately concerned are clearly indicated, as are also the course of Wellington Brook, Alewife Brook, and the location of the Mystic River, as well as of the new channel which has already proved so effective.

Photographs made by the author illustrating what has been done, as well as the need of still further improvements in the lower part of the territory under consideration, are appended. The legend under each will suffice for its explanation. The points where the photographs, Figures 1, 2, 3, etc., were taken, are indicated on the map by corresponding numerals enclosed in circles; and in several cases small arrows adjoining the circles show the direction in which the camera was pointed.

NOTE ON DRAINAGE AND MOSQUITOES.

"After all, the best of the means which may be adopted against mosquitoes will always consist in the abolition of their breeding-places. Small pools with stagnant water can be 'treated,' but it is a great deal better to drain them or to fill them up. Swamp areas must sooner or later be drained. It is perfectly obvious that, the sooner this is done, the better from every point of view, not only from that of human health, but from the increased value of real estate in the neighborhood and from the practical value of the reclaimed land itself. The

time is coming, and rapidly, when this drainage of large swamps will not remain a matter which concerns the individual owner of the land, but one for town or county action, and even for States. The report of T. J. Gardner on the policy of the State respecting drainage of large swamps, published in the Report of the Board of Health for New York, Albany, 1885, although antedating the recent important mosquito discoveries, is well worth reading by all public-minded persons; and the annual reports of the State geologist of New Jersey, for 1897 and 1898, in which the reclamation of the great Hackensack Meadows, near New Jersey City, Newark, and Elizabeth, New Jersey, make interesting reading along this line. Work on these marshes has actually been begun. The solution of this case is taking the form of separate action by cities and their municipalities, each improving the territory within its corporate limits. The city of Newark has a tract of 4,600 acres of marsh within its limits. Jersey City has within its limits 2,086 acres of tide-marsh, and Elizabeth has 2,658 acres. The three cities, therefore, have about 8,700 acres of the 27,000 acres lying between Elizabeth and Hackensack. The sanitary importance of reclaiming these lands is of the greatest; but the capabilities of the improvement plans are also attracting attention on the part of capitalists and business men, who see in these tide-lands valuable sites for manufacturing, industrial, and commercial activity." — *Professor L. O. Howard, Entomologist, United States Department of Agriculture*, "Notes on the Mosquitoes of the United States," p. 63, Washington, 1900.

THE CHAIRMAN.— This paper, gentlemen, is now open for discussion. I notice Dr. Cogswell, of Cambridge, here. Perhaps his experience might be of interest to the Association.

DR. COGSWELL.— Mr. Chairman, I cannot say anything in addition to what Mr. Underwood has told you. I used to be more or less familiar, as he was, as a boy, with portions of the territory, and I have been there many times since; and I can say it is all true in regard to the bad condition that has existed up to the time of the digging of the ditch. I have no doubt that the changes that we have seen on the pictures are actual representations of what has taken place. There is certainly abundant opportunity for further improve-

ment in the other part of the territory. I don't wish to be held up as having any better knowledge of the facts than Mr. Underwood, who, I think, was born there, at any rate has lived there, to my certain knowledge, a great many years.

PROFESSOR SEDGWICK.— Mr. President, I would like to say just one word. It seems to me, Mr. Underwood's work is interesting, mainly from this point of view: It shows that, when two or three neighboring towns choose to co-operate for mutual good, for the common good, they can in many cases do a great deal for a very small sum. Here were two towns. Each might have said that it was the work of the other. Each was inclined originally to say that; but by putting their joint efforts to work they cleaned out that ditch and drained a lot of marshes. It is difficult to realize that a place like this existed so long so near the metropolis of New England,— existed and, in part, still exists there. But I think the thing that is most instructive in it all is the example which it furnishes,— the very excellent example of co-operative work by neighboring towns. It too often happens that neighboring towns are more or less hostile, or that they insist on cavalierly throwing off one upon the other any work that is to be done, even when it can be shown to be for the mutual good. Here is a case in which the city of Cambridge and the town of Belmont got together and did a good, creditable piece of sanitary work. If now the four communities — Arlington, Somerville, Cambridge, and Belmont — should further co-operate, put in those tide-gates and dig a pool or lagoon to hold the water that accumulates between tides, a much greater improvement might be made. I have no doubt there are similar cases in other parts of the State.

THE CHAIRMAN.— This is a most interesting matter for the consideration of every board of health within the State. I can scarcely imagine a town in the entire State of Massachusetts in which there may not be found some stagnant pools and unhealthy marshes, such as have been depicted here this afternoon; and it may be interesting for boards of health to realize that, under our statute law, each local board has the right to examine, give notice, hearings, and then proceed and drain these places, up to the limit of $2,000 in any single instance. Before a dozen years ago this amount of expenditure was

unlimited. It was then, owing to a little difficulty in one of the cities of the Commonwealth, limited to $2,000; but up to that extent any board of health may proceed, and do this kind of work which has been illustrated this afternoon. It seems to me, with the increased intelligence now given in regard to the mosquito, that that alone would be sufficient excuse for any board of health to proceed in behalf of the comfort of their citizens in draining these territories, such as has been shown this afternoon. I hope the discussion is not ended, and that there will be more said by those interested in this class of work.

DR. SMITH.— Mr. Chairman, I should like simply to say one word. It seems to me that the speaker has very well brought out the bad influence which our railroads have had upon the natural drainage of the soil. That is quite conspicuous in the chart, and I have noticed it for the past four or five years in making field studies on the prevalence of malaria for the State Board of Health. I have observed in many places in the State how the stagnant pools and stagnant trenches have been created in defiance of public health by the railroads in throwing up their embankments. It seems to me that, in considering this question, these forces for evil should be brought to terms in purging the State of malarial influences.

MR. COFFEY.— Mr. Chairman, we had a case somewhat similar to this, only of much smaller area, in Worcester, and caused, too, as Dr. Smith has said. The construction of a railroad embankment, I think, was largely the cause of the trouble there. In reference to what the Chairman has said about boards of health having ample authority to enter upon these lands and take the necessary steps for the abatement of the nuisance, the trouble is, as we found at Worcester, that you must have an appropriation; that is, the ordinary appropriations which are granted to health departments are not sufficient to pay for this work. It can be collected, to be sure, from the abutters and from the owners of the swampy, wet, rotten, and spongy lands; but in the mean time you must have an appropriation, in order that the work may be paid for as it is done. It may take some time, of course, to collect from those abutters. You can collect under the law, as you collect for delinquent taxes; but, if they should fight, it might drag along through the courts for several years. In the

mean time the people who do the work of course must be recompensed. In Worcester we did not have any appropriation; but we got after the railroad company, who owned this swampy land, and induced them to act by intimating, in the communication that we sent them, that, unless they did take some measures to abate the nuisance, we would enter the land. The statute was quoted for their benefit. The end was that we induced them to fill up the swamp and drain it. Another swamp that we had was down in the lower part of the city; that is, it was an old brook bed, called Middle River. It really was never a river. Vegetation had been allowed to grow up in it, and the vegetation had filled up the brook bed. The waters had spread over quite a large area, and the matter held in suspension was precipitated. Then at times of low water, in the hot and dry months of the summer, the sun poured down upon this precipitation that had more or less organic matter, and odors arose from it. Of late years we have been having considerable malaria in the vicinity of this brook, something that until recent years was comparatively unknown in Worcester. We sent a communication to the City Council; and we recommended that the waters of this brook be enclosed by walls, in that way preventing the spread of the water and confining it, so that of itself it would be self-cleansing. It was found by our law department that before we could do this it would be necessary to get permission from the legislature, and that was done at the last session. I think there is a bill coming up in reference to it again at this session. The City Council has voted to carry out our recommendation; and we hope that, when this is finished, we shall at least have less malaria than we now have.

Professor Sedgwick.— Mr. President, there is one other point that I think is worth raising, and that is this: Under existing laws, as I understand it, if Cambridge had refused to take any action, Belmont would have been helpless except by going to the legislature. Cambridge proved to be a good neighbor, and has done her part admirably. But it seems to me that cases are bound to arise in which neighbors may need a little prodding; and it seems to me also that the way things are going in our State, which is becoming more and more densely populated, and with our confidence in the higher sanitary authorities, the time is not very far distant when we are

going to delegate some more central powers to the State Board of Health, or some similar central authority, in order that they may deal with cases like this, so that it shall not be necessary for a town like Belmont, which finds its lands being overflowed by stoppages in the town below, over which it has no control, to go to the legislature to force the lower town to clean out its ditch. It seems to me that this point is worth raising and keeping in mind, because I believe that the State Board of Health ought to have distinctly more authority than it has to-day. While I should not go so far as to say that it ought to have all the powers that the Local Government Board has in England, I think we are moving in that direction, and rightly moving in that direction.

THE CHAIRMAN.— Is there anything further to be said on this question?

DR. ABBOTT.— Before we adjourn, I would like to say a word in regard to the typhoid fever work which the board has undertaken recently. Within the past week or two we have been called upon quite often by physicians in different parts of the State to examine specimens of blood with reference to the diagnosis of typhoid fever; and we have now made arrangements so that local boards of health can have the different means and appliances kept under their supervision, so that they can be sent directly to Dr. Smith. I have some of these here. Please to pass these around, that the members here can see what they are.

MR. COFFEY.— Mr. President, I had this proposed amendment to the constitution handed to me by Dr. Hill.

> At any regular meeting of the Association names may be proposed for election as honorary members. Such names may be voted on at the same meeting, if approved by the Executive Committee, and, if elected, shall immediately become life members, without dues.

On motion of Dr. Abbott, seconded by Mr. Coffey, it was voted that this proposition be referred to the Executive Committee.

MR. COFFEY.— Now I should like to move that another matter be referred to the Executive Committee, and that is that some investigation be made by the Executive Committee on the question of estab-

lishing somewhere in Massachusetts a school for health officers. I understand this movement has started in other places, in some of the States. I understand Vermont has started something of this kind. I know the American Public Health Association has passed a vote recommending that something of this kind be done; and it seems to me that Massachusetts, with all the schools and colleges that we have here, should not be behind any of the other States in sanitary matters. Massachusetts has always been a leader; and it seems to me that this matter is a step in the right direction, that health officers might, if summer schools were established, obtain certain knowledge and information that would better qualify and fit them for the duties which they are to fulfil. I would move that the Executive Committee look up the matter, and make such recommendations as they may deem proper,— or make it a special committee, I am not particular.

THE CHAIRMAN.— If the mover of this question will allow me, I would venture to say that there are so few present, and it is a question of so much importance, that it might be better to permit the remarks now made to go before the Association in the *Journal*, and then be discussed and acted upon at the following meeting rather than to take a vote with so very few present.

MR. COFFEY.— All I desire is to bring it to the attention of the Association, so that it may be discussed or something done at the next meeting. That is my only object.

DR. HILL.— Would a motion be in order to have it referred now to the Executive Committee, so that they can consider it in the interval?

MR. COFFEY.— That is what I thought, that possibly they might consider it in the interval, and, if they saw fit at the next meeting, make a report on it, if they could; and, if not, they could let it go till the meeting following.

THE CHAIRMAN.— The chair will entertain the motion, if you prefer. It is moved and seconded that the question of establishing a school for the education of candidates for public health offices be referred to the Executive Committee.

The motion was adopted, and on motion of Mr. Coffey the meeting then adjourned.

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